Short Form Work Paper WPSDGENRWH1206

**Revision 2**

**San Diego Gas & Electric**

**Energy Efficiency Engineering**

**Tankless Water Heaters for Commercial Applications**

**November 2, 2018**

# Space Heating Boilers Short Form WP

## Introduction

This short form workpaper documents the Ex-ante data by referencing the DEER/READI database Measure IDs. The cost values for instantaneous water heaters rated above 200 kBtuh are adopted from SCG’s approved workpaper entitled “Tankless Water Heaters for Commercial Applications” (WPSCGNRWH120206B Rev6 dated July 26, 2016). Table 1 below documents the Technology Cost IDs adopted from DEER Technology Cost Tables and those adopted from SCG workpaper.

Table 1: DEER Measure IDs and Adopted Technology Cost

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SDGE Imp. ID | SCG Impl. ID | DEER Msr ID | Msr Cost ID / Cost Value | Std Cost ID / Cost Value | IMC |
| 464268 | 540216 | NG-WtrHt-LrgInst-Gas-gt200kBtuh-0p80Et | NG-WtrHt-LrgInst-Gas-gt200kBtuh-0p80Et-FULL / $ 17.94 | Stor\_TE-Gas-gte75kBtuh-0.80TE / $8.74 | $9.20 |
| 402040  464269 |  | NG-WtrHt-LrgInst-Gas-gt200kBtuh-0p85Et | NG-WtrHt-LrgInst-Gas-gt200kBtuh-0p85Et-FULL / $19.95 | Stor\_TE-Gas-gte75kBtuh-0.80TE / $8.74 | $11.21 |
| 464270 | 540217 | NG-WtrHt-LrgInst-Gas-gt200kBtuh-0p90Et | NG-WtrHt-LrgInst-Gas-gt200kBtuh-0p90Et-FULL / $22.01 | Stor\_TE-Gas-gte75kBtuh-0.80TE / $ 8.74 | $13.27 |

Note:

1. \* - Denotes the units are “Each” for Tankless Water Heaters rated below 200 kBtuh;
2. The units are “Cap-kBtuh” for ratings above 200 kBtuh.
3. Interpolated the Technology Cost for “NG-WtrHt-LrgInst-Gas-gt200kBtuh-0p85Et-FULL” as follows:

|  |  |
| --- | --- |
| X (Et) | Y ($/unit) |
| 0.8 | 17.94 |
| 0.9 | 22.01 |
| 0.85 | =40.7\*(x)-14.62 = 19.95 |

**Document Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 0 | 06/15/2012 | Kelvin Valenzuela / SDG&E | Adopted from WPSCGNRHC120206B\_Rev3\_TanklessW\_NonRes-May25.docx Space Heating Boiler-May22.docx, updated May 18, 2012. |
| 1 | 1/02/2018 | Eduardo Reynoso / SDG&E | 1. Proposed abridge short form workpaper for EAR team review.  2. Adopted costs in support of the tankless water heaters rated “>200 kBtuh” from Southern California Gas Company workpaper WPSCGNRWH120206 B Rev6 Commercial Boilers dated July 26, 2016.  3. Adopted Cost IDs from DEER Technology Cost tables for tankless water heaters rated below 200 kBtuh.   * For DEER Msr ID “NG-WtrHt-SmlInst-Gas-150kBtuh-lt2G-0p82EF-40g” adopted Measures Cost ID “Inst\_EF-Gas-150kBtuh-0p82EF” and Standard Cost ID “Stor\_EF-Gas-040gal-0.62EF”. * For DEER Msr ID “NG-WtrHt-SmlInst-Gas-150kBtuh-lt2G-0p92EF-40g adopted Measure Cost ID “Inst\_EF-Gas-150kBtuh-0p92EF” and Standard Cost ID “Stor\_EF-Gas-040gal-0.62EF”.   3. Interpolated cost between large tankless water heaters in support of a new tier 2 for 85% TE tankless water heater measure: Tankless Water Heater,>200 MBtu/hr (Large), Tier 2 (>=0.85 TE) to support SDG&E’s legacy Implementation ID 402039.  4. Updates impacts and Measure ID for SDG&E Legacy Implementation 402039 by adopting DEER Msr ID “NG-WtrHt-SmlInst-Gas-150kBtuh-lt2G-0p82EF-40g”.  3. Adopted SCG air quality emission requirements. |
| 2 | 11/19/2018 | Eduardo Reynoso/ SDG&E | 1. Retired measures and offering for instantaneous water heater with rating below 200 kButh, because CPUC DEER Resolution E-4952 “DEER-WaterHeater-Calculator-v3.2\_rev25Sep2018” does not support or offer these measures in DEER database for 2018/2019/2020 program year. 2. SDG&E is retiring product offering (implementations) 402039 and 464267 as of 3/1/2018 to co-inside with the 2018 CPUC Phase 1 Disposition for Domestic Water Heater with EF rating. |

Eligibility Requirements

* + - 1. Test[[1]](#endnote-1) methods for measuring water heater efficiencies are referenced in the California Titles 20 and 24 standards1,2.
      2. Minimum qualifying energy factor (EF) for small (<200 MBtu/hr) tankless water heaters replacing storage water heaters:
         1. 0.82 for Tier 1 (non-condensing)
         2. 0.90 for Tier 2 (condensing)
      3. Minimum emission requirements per air district.
      4. Minimum qualifying thermal efficiency (TE) for large (≥200 MBtu/hr) tankless water heaters replacing storage water heaters:
         1. 80% for Tier 1 (non-condensing)
         2. 90% for Tier 2 (condensing)
      5. Tier 2 hot water heaters are condensing.

Implementation Requirements

* + - 1. The rebate applies to gas-for-gas equipment replacements on burnout or to new installations.
      2. New Construction rebates only available for large tankless water heater.
      3. This measure is applicable to any commercial domestic (or “service”) hot water application. Table 4 - displays approved sectors and subsectors.
      4. This Workpaper does not cover water heaters or hot water boilers used for space conditioning, industrial (process) end-use applications, pools, or spas.
      5. Applicable building/business types include (but are not limited to) offices, restaurants, retail establishments, schools, colleges, hotels, motels, and recreational facilities.
      6. Typical NAICS codes include but not limited to: 111-112, 42, 44-45, 48-49, 51-56, 61-62, 71-72, 81, and 92.
      7. This measure includes replacing a storage water heater with a tankless water heater.

1. Sector and Subsector

|  |  |  |
| --- | --- | --- |
| ***Sector*** | ***Subsector*** | ***Comment*** |
| Com | Com | measure applicable to any commercial subsectors |
| Ind | Any | measure applicable to any industrial subsectors |
| Ag | Any | measure applicable to any agricultural subsectors |

Documentation Requirements

* + - 1. The manufacturer’s name and equipment model number must be provided.
      2. If necessary, customer must provide proof of unit efficiency (e.g., manufacturer’s equipment specification sheet).

Terms & Conditions

* + - 1. Only instantaneous water heaters as defined by the California Energy Commission qualify, and they must:
         1. Be used primarily for domestic hot water
         2. Provide hot water only when there is a hot water draw from the end use
         3. Not be connected to an external storage tank.
         4. Have an input rating of at least 4,000 Btu per hour per gallon of stored water.
         5. Never be used to supply hot water to a circulation loop.

**Measure Summary**

**Table 1: Measure Summary Table**

| **Section** | **Value** |
| --- | --- |
| **Summary & Purpose** | This short form workpaper documents ex-ante load impacts cost-effectiveness values for instantaneous water heaters or tankless storage water heaters for commercial applications. The cost values and respective Cost IDs are adopted from SCG’s workpaper and DEER Technology Cost Tables as described in the revision history above herein. All other parameters except for costs are per DEER/READI and are used by SDG&E as noted in Revision History herein. |
| **1.1 Measure & Baseline Data** | Per DEER/READI with MeasureIDs as noted herein.   |  |  |  | | --- | --- | --- | | SDGE Imp. ID | DEER Msr ID | Description | | 402039 (retired) | NG-WtrHt-SmlInst-Gas-150kBtuh-lt2G-0p82EF-40g | Tankless Water Heater, <=200 kBtu/hr (Small / Medium), Tier 1 (>=0.82 EF) | | 464267 (retired) | NG-WtrHt-SmlInst-Gas-150kBtuh-lt2G-0p92EF-40g | Tankless Water Heater, <=200 kBtu/hr (Small / Medium), Tier 2 (>=0.92 EF) | | 464268 | NG-WtrHt-LrgInst-Gas-gt200kBtuh-0p80Et | Tankless Water Heater, >200 kBtu/hr (Large), Tier 1 (>=0.80 TE) | | 402040  464269\* | NG-WtrHt-LrgInst-Gas-gt200kBtuh-0p85Et | Tankless Water Heater,>200 kBtu/hr (Large), Tier 2 (>=0.85 TE) | | 464270 | NG-WtrHt-LrgInst-Gas-gt200kBtuh-0p90Et | Tankless Water Heater,>200 kBtu/hr (Large), Tier 3 (>=0.9 TE) | | Note:   1. SDG&E Implementation 464269 has a delivery method of “DirInstall - Direct Install” and all other Implementations are “PreRebDown”. 2. SDG&E Implementations 402039 and 464267 have a retired date of 3/1/2018 to align with CPUC phase 1 disposition for Domestic Water Heaters with EF rating . | | |   Measure & Delivery Description  Measure Description   * + - 1. Tankless water heaters have become available in recent years for a variety of applications. Relative to a storage water heater, a tankless unit has a relatively large burner that rapidly heats water to the desired temperature. Due to the rapid “instantaneous” heating, a tankless water heater does not require a storage tank, although a small tank may be included.       2. Due to the relatively larger burner size, these water heating devices are capable of providing hot water on a continuous basis. They have relatively high energy efficiency levels because standby losses from storage tanks are essentially eliminated.       3. The California Titles 20 and 24 standards define an instantaneous water heater to mean “a water heater that has an input rating of at least 4,000 Btu per hour per gallon of stored water”[[2]](#endnote-2),[[3]](#endnote-3). All “tankless” water heaters are “instantaneous” water heaters, but the term instantaneous water heater also includes large commercial hot water boilers, which are not covered by this Workpaper. Tankless water heaters generally have rated inputs less than 200 MBtu/hr.       4. Tankless water heaters are most useful in point-of-use applications, i.e., at the faucet and with no circulation loop. They are very inefficient in applications with a circulation loop due to the temperature loss in the circulation system which causes the tankless water heater to run without water demand. They are problematic in central systems with circulation loops which have long pipe runs from the water heater to the faucet. |
| **1.2 Technical Description** |  |
| Measures | Per DEER/READI Measures IDs as noted herein above per Revision History |
| Code for All Measures | Title 20 and Title 24 as reflected and referenced in DEER |
| **1.3 Installation Type and Delivery Mechanisms** |  |
| Installation Type | * Replace On Burnout (ROB) |
| Delivery Mechanisms | * Downstream Rebate – Deemed * Direct Install - Deemed |
| **1.4.1 DEER Data** |  |
| DEER Measure ID 1  DEER Measure ID 2  DEER Measure ID 3  DEER Measure ID 4  DEER Measure ID 5 | NG-WtrHt-SmlInst-Gas-150kBtuh-lt2G-0p82EF-40g  NG-WtrHt-SmlInst-Gas-150kBtuh-lt2G-0p92EF-40g  NG-WtrHt-LrgInst-Gas-gt200kBtuh-0p80Et  NG-WtrHt-LrgInst-Gas-gt200kBtuh-0p85Et  NG-WtrHt-LrgInst-Gas-gt200kBtuh-0p90Et |
| Net-to-Gross Ratio | Com – Default>2yrs SDG&E is using the default as there is no other applicable NTGD |
| Effective and Remaining Useful Life | |  |  |  | | --- | --- | --- | | EUL ID | Description | EUL\_Yrs | | WtrHt-Instant-Com | Commercial Instantaneous Water Heater | 20 | | WtrHt-Com | Commercial water heater | 15 | |
| **Section 2. Calculation Methodology** | Measures will be processed using DEER Measure/Impact ID by building type and Building Location. All will be processed and claimed using “Existing” vintage. |
| Energy Savings/Peak Demand Reduction – All Measures | All Energy Impacts per DEER Measure IDs noted above |
| **Section 3. Load Shapes** | ElecImpProfile: SDGE:35-OTI-OtherIndustrial-PROC\_OTH  Gas: Annual |
| **Section 4. Costs** |  |
| Base Cost | |  |  |  |  |  | | --- | --- | --- | --- | --- | | SDG&E Impl. ID | SCG Impl. ID | Base Cost ID | Base Cost Value | Units | | 464268 | 540216 | Stor\_TE-Gas-gte75kBtuh-0.80TE | $8.74 | Cap-kBtuh | | 402040  464269 |  | Stor\_TE-Gas-gte75kBtuh-0.80TE | $8.74 | Cap-kBtuh | | 464270 | 540217 | Stor\_TE-Gas-gte75kBtuh-0.80TE | $ 8.74 | Cap-kBtuh | |
| Measure Cost | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | SDG&E Impl. ID | SCG Impl. ID | Measure Cost ID | Msr Cost Value | IMC | Units | | 464268 | 540216 | NG-WtrHt-LrgInst-Gas-gt200kBtuh-0p80Et-FULL | $ 17.94 | $9.20 | Cap-kBtuh | | 402040  464269 |  | NG-WtrHt-LrgInst-Gas-gt200kBtuh-0p85Et-FULL | $19.95 | $11.21 | Cap-kBtuh | | 464270 | 540217 | NG-WtrHt-LrgInst-Gas-gt200kBtuh-0p90Et-FULL | $22.01 | $13.27 | Cap-kBtuh | |

1. [↑](#endnote-ref-1)
2. [↑](#endnote-ref-2)
3. h [↑](#endnote-ref-3)